7139 Ga. Ave.,N.W.
Washington, D.C.
September 2, 1942

Mr. George Webster
Pledge Chairman
Maryland Beta Chapter
Tau Beta Pi

Dear Mr. Webster

Attached to this letter you will find the thesis that you requested as part of the pledge duties for entrance into the Beta Chapter of Tau Beta Pi. The subject chosen was Aeronautical Engineering at the University of Maryland. The purpose of the topic was to give a brief summary of the curriculum along with some criticisms and suggestions as to the subjects and the instruction.

Since the views presented are my own and were gained from personal experience while taking the course I have included no bibliography because there were no references used. Information as to the exact subject matter taken in each of the subjects listed may be obtained from a University of Maryland catalogue. Space did not permit a discussion each of the subjects in the curriculum.

Respectfully,

Robert M. Rivello

Robert M. Rivello

A THESIS

on

AERONAUTICAL ENGINEERING AT THE UNIVERSITY OF MARYLAND

Prepared for

the

MARYLAND BETA CHAPTER
TAU BETA PI

By

Robert M. Rivello

University of Maryland

September 2, 1942

SUMMARY

The material contained in this thesis covers the curriculum taken by students in mechanical engineering aeronautical option at the University of Maryland. Much of the discussion concerns remarks, suggestions, and criticisms of the courses and instruction. This discussion puts forth the personal views of the author based on three and one half years at the university while taking the course and upon the comments which he observed from his fellow students concerning the course. A brief introduction is given as to the purpose of the course.

AERONAUTICAL ENGINEERING AT THE UNIVERSITY OF MARYLAND

PURPOSE OF THE COURSE

"The primary purpose of the College of Engineering is to train young men to practice the profession of Engineering. It endeavors at the same time to equip them for their duties as citizens and for careers in public service and in industry."[1] At the present time it is also doing all that it can to aid in the all out war effort. In this connection three terms a year are now being given so that the student may graduate in three and two thirds years instead of the usually four. During this emergency the student may also select technical rather than the hithertofore required non-techmical electives so as to broaden engineering field of knowledge and better fit him for this technical war.

DISCUSSION OF CURRICULUM

Probably the best way to evaluate any engineering course

Curriculum

	Semester I	Semester II
Freshman Year—Alike for all engineering courses.		
Survey and Composition I (Eng. 1y)	3	3
Reading and Speaking (Speech 1y)	1	1
*College Algebra and Analytic Geometry (Math. 21f, 22s)	4	4
General Chemistry (Chem. 1y)	4	4
Engineering Drawing (Dr. 1f)	2	—
Descriptive Geometry (Dr. 2s)	—	2
Forge Practice (Shop 1s)	—	1
Introduction to Engineering (Engr. 1f)	1	—
Basic R. O. T. C. (M. I. 1y) or Physical Education (Phys. Ed. 1y)	1	1
†Elective	3	3
	19	19

Fig. 1

[1] Dean S.S. Steinberg, in the Univ. of Md. Catalogue 1941-42, Univ. of Md. Offical Publication, page 168

is to examine its curriculum and facilities. Fig. 1 shows the subjects required of all freshmen in the University of Maryland College of Engineering. No specialization as to the branch of engineering studied is made until the second year. To aid the student in the selection of his field one of the required freshman courses is Introduction to Engineering in which students attend lectures given by engineers who are prominent in their fields. This course is an excellent idea for orientation and gives the man entering engineering a brief background of its various branches so that he may make a wise selection in his sophomore year. The drawing and forge shop courses given in the first year are very good and very well handled. It is my belief that the course in general chemistry should be changed to one more adaptable to engineering with more stress on metallurgy and other subjects more directly connected with engineering rather than some of the more abstract material taken in the second semester of chemistry. College Algebra and Analytical Geometry give the student a good background for his other mathematical subjects to be taken in following years. In general, the math courses at the university are excellent and are well connected to practical problems.

Fig. 2 illustrates the work studied by the student in his sophomore year. It is common to both mechanical engineering and aeronautical option students. It may be noted that Plane Surveying is included in this mechanical engineering curriculum. This is given to aid the student in gaining summer employment

and also give him enough knowledge of the subject to deal with related problems that he may meet in mechanical engineering. The course is very good, but the work required greatly outweighs the single credit given for the subject. The physics course is par-

Curriculum

	Semester I	Semester II
Sophomore Year		
Oral Technical English (Speech 5f)	2	—
Calculus (Math. 23y)	4	4
General Physics (Phys. 2y)	5	5
Advanced Engineering Drawing (Dr. 3f)	2	—
Elements of Plane Surveying (Surv. 1s)	—	1
Machine Shop Practice (Shop 3f)	2	—
Statics and Dynamics (Mech. 2s)	—	5
Fundamentals of Economics (Econ. 57f)	3	—
Basic R. O. T. C. (M. I. 2y) or Physical Education (Phys. Ed. 3y)	2	2
Non-Engineering Elective	—	3
	—	—
	20	20

†Alternates.
‡Elective may be R. O. T. C.; Thesis (E. E. 114y), with approval of head of department; a course in Fundamentals of Business Administration (O. and M. 110f; Engineering Law and Specifications (Engr. 102s), or other approved courses.

Fig. 2

ticularly fine and gives the student a good solid background for many of the subjects taken in the following years. The course given in Machine Shop Practice gives the undergraduate practical experience in methods of fabrication which will aid him later in design. The engineering shops and laboratories are very well equipped for instruction purposes.

It is not until the last half of the junior year that the student encounters any aeronautical subjects (see fig. 3). Juniors in aeronautical engineering are required to take Differintial Equations for Engineers which ties in calculus to

to practical problems. The course in Materials of Engineering is naturally an important one in the engineering curriculum, but it is in my opinion very poorly handled at the university. This was primarily caused by the fact that the laboratory instructor was not familiar with the subject which he was teaching and not by the subject matter of the course. Thermodynamics

Junior Year—Aeronautical Option		
Advanced Oral Technical English (Speech 6s)	—	2
Differential Equations for Engineers (Math. 114f)	3	—
Strength of Materials (Mech. 101f)	5	—
Materials of Engineering (Mech. 103s)	—	2
Foundry Practice (Shop 101f)	1	—
Machine Shop Practice (Shop 102s)	—	1
Principles of Electrical Engineering (E. E. 102y)	4	4
Thermodynamics (M. E. 104y)	2	3
Aerodynamics and Hydrodynamics (M. E. 105s)	—	3
*Non-Engineering Elective	3	3
Technical Society	—	—
	—	—
	18	18

Fig. 3

and Strength of Materials are two courses of a theoretical nature which have very practical applications. Speech is again required. It is my belief that little is learned or gained from speech after the first two years and the time spent on it in the junior and senior years is, for the most part, wasted. Principles of Electrical Engineering is not as practical as it could be. I believe that the mechanical or aeronautical engineer would profit more from a course which would deal more with the uses and selection of electrical equipment than with a whole year of electrical theory. Since the course in Aero and Hydrodynamics is primarily intended for aeronautical students it is my opinion that more time should be spent on the aerodynamics

of the airplane than on the flow of liquids.

The senior year is probably the most practical of any of the years in engineering. The curriculum for this year is given in fig. 4. The student may chose his thesis subject from a large number suggested and sponsored by the faculty. Speech in the senior year has already been commented on. The courses in Airplane Structures and Mechanical Engineering Design are excelent and keep the student abreast with the latest developments in these fields. Much of the work in these courses are taken

	Semester	
Senior Year—Aeronautical Option	*I*	*II*
Advanced Oral Technical English (Speech 7y)	1	1
Thesis (M. E. 108y)	1	2
Prime Movers (M. E. 109y)	4	4
Mechanical Engineering Design (M. E. 110y)	4	3
Mechanical Laboratory (M. E. 111y)	2	2
Airplane Structures (M. E. 112y)	3	3
†Elective	3	3
Technical Society	—	—
	—	—
	18	18

Fig. 4

is taken directly from technical reports made recently. The senior year attempts to bridge the gap between college and industry.

GENERAL CRITICISMS

The war has caused a lot of changes in the course and instruction at the university and will undoubtably cause many more. Good instructors are hard to get and hard to retain due to the increased demand for engineers in industry. For the most part, Maryland is fortunate in having good professors and instructors.

One criticism of a great many of the courses is that the maximum use is not made of models and illustrative material. In this connection some of the of the instructors say that this would put the college on the same level as the trade school, and that the instruction should be more theoretical than illustrative. They have a point but a happy medium must be met. The instructor has in most cases worked with the machinery, mechanism, motor, or engine and has a working picture of them in his mind that the student lacks and must attempt to visualize. It would certainly be to the students advantage to have the mechanism, or a model of it before him in lectures so that he may tie in his theory to actual construction. There is room for much improvement in this field in Maryland.

It is also interesting to note that many other universities are much more specialized in their aeronautical curriculum and teach courses in propeller design, wind tunnel technique, and aircraft power plants. The reason for the lack of this specialization at Maryland is that by giving the student fundamentals he can easily learn these special problems if the need be. One mistake that I believe that the mechanical engineering department has made is the dropping of kinematics from its curriculum. An attempt has been made to give a brief introduction to this in Mechanical Engineering Design since it is needed in machine design but this introduction is to brief and

is entirely inadequate. If given this subject would have to replace something else rather than just be added due to the fullness of the program at the present time.

CONCLUSION

In conclusion, it is my opinion, that the course in aeronautical engineering at the University of Maryland is, as a whole, good. The shop, laboratory, and drawing room facilities are for the present enrollment adequate, but there is a lack of lecture room illustrative material. An increase in enrollment will make it necessary to expand existing facilities. I believe that the course would be improved by dropping speech in the junior and senior years and adding kinematics.